valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent the rotor from over-speeding.

13. (once amended) A gas turbine engine comprising:

a rotor;

a fuel delivery system configured to supply fuel to said engine for operating said rotor; and

a fuel system interface coupled to said fuel delivery system to receive a plurality of electrically and mechanically originated over-speed signals from the engine, said interface comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent said rotor from over-speeding.

REMARKS

The Office Action mailed January 31, 2002 has been carefully reviewed and the foregoing amendment has been made in consequence thereof. Submitted herewith is a Submission of Marked Up Paragraphs and Claims.

Claims 1-3, 5-9, 11-16, and 18 are now pending in this application. Claims 1-18 stand rejected. Claims 4, 10, and 17 have been canceled.

In response to the election of a species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable, Applicant elects the species of Figure 2. Claims 1-3 and 5-18 belong to the elected species. Furthermore, Applicant submits that Claim 1-3 and 5-18 are generic and read on the elected species.

The requirement for election is traversed because the inventions set out by the claims clearly are related, a thorough search and examination of any claim group (it is believed) would be relevant to the examination of the other group, and requirements for election are not mandatory under 35 U.S.C. Accordingly, reconsideration of the election requirement is requested

The objection to the disclosure is respectfully traversed. More specifically, the specification has been amended at page 5, line 9 to recite "[s]econd selector valve 68...."

Accordingly, for at least the reason set forth above, Applicant respectfully requests that the objection to the specification be withdrawn.

The objection to the drawings under 37 C.F.R. 1.183(a) is respectfully traversed. Applicant respectfully submits that including an engine control system within the Figures is not necessary for an artisan of ordinary skill in the art to understand the invention, and as such is unnecessary. More specifically, Applicant submits that such control systems are known and that an artisan of ordinary skill in the art would understand the present invention including the interaction with an engine control system after reading the specification in light of the Figures. For the reasons set forth above, Applicant respectfully requests that the Section 1.183 objection to the drawings be withdrawn.

The rejection of Claims 1-18 under 35 U.S.C. § 112 is respectfully traversed. More specifically, the specification has been amended at page 2 to recite "a fuel system interface for a gas turbine engine prevents a rotor from over-speeding and receives an over-speed signal from either an electrically-originated and/or a mechanically-originated over-speed sensing system." Accordingly, Applicant submits that one skilled in the art, after reading the specification in light of the figures, would understand that the fuel system interface is configured to receive over-speed signals from both electrically-originated and mechanically-originated sources.

Furthermore with respect to Claim 1, Claim 1 has been amended to remove the step of "configuring" and recites "coupling". Claim 4 has been canceled. Claims 2, 3, and 5 depend, directly or indirectly from claim 1.

Claim 6 has been amended to remove references to the fuel system interface being "configured" and recites "said interface coupled to the gas turbine engine...said interface comprising a shutoff shuttle valve...." Claim 10 has been canceled. Claims 7-9, 11, and 12 depend, directly or indirectly, from Claim 6.

Claim 13 has been amended to remove references to the fuel system interface being "configured" and recites "said fuel system interface coupled to said fuel delivery system to receive a plurality of electrically and mechanically originated over-speed signals...said interface comprising a shutoff shuttle valve...." Claim 17 has been canceled. Claims 14-16

and 18 depend, directly or indirectly, from Claim 13. For at least the reasons set forth above, Applicant requests the Section 112 rejections of Claims 1-18 be withdrawn.

The rejection of Claims 1-18 under 35 U.S.C. § 102 as being anticipated by Riple is respectfully traversed.

Riple describes a fuel control system 10 for a gas turbine engine that receives input from a hydraulic speed signal generator 28 coupled to a drive shaft 26. More specifically, an electronic monopole speed sensor 32 is coupled with generator 28 to produce an electrical signal input to an electronic trim control circuit 72 for system 10. Fuel flow from a main flow fuel pump 22 is channeled through a control bypass valve 44 that is coupled by mechanical linkage to a speed control actuator 54. Actuator 54 controls fuel flow through valve 44 to determine an operating speed of an associated gas generator 16. More specifically, actuator 54 is coupled via linkage 68 to a manually operated speed control 70, which provides input to compress a spring 76. Movement of spring 76 positions valve 44. If speed control electronic trim 72 fails, Riple describes that safe operation of the engine may be maintained using speed control actuator 54.

Claim 1 recites a method for assembling a gas turbine engine to prevent rotor over-speeding, wherein the method comprises the steps of "coupling a fuel system interface including a shutoff shuttle valve to the gas turbine engine such that the fuel system interface receives electrically and mechanically originated over-speed signals inputted from the engine... coupling the fuel system interface shutoff shuttle valve to the fuel system to stop engine fuel flow in response to the over-speed signals received, and based on pre-defined priority logic."

Riple does not describe nor suggest a method for assembling a gas turbine engine to prevent rotor over-speeding, wherein the method includes the steps of coupling a fuel system interface including a shutoff shuttle valve to the gas turbine engine such that the fuel system interface receives electrically and mechanically originated over-speed signals inputted from the engine, and coupling the fuel system interface shutoff shuttle valve to the fuel system to stop engine fuel flow in response to the over-speed signals received, and based on pre-defined priority logic. Specifically, Riple does not describe nor suggest a fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the

present invention, Riple describes a fuel control system that shuts of fuel flow via mechanical linkage when a predetermined operating speed is exceeded, rather than in response to pre-defined priority logic. For at least the reasons set forth above, Claim 1 is submitted to be patentable over Riple.

Claim 4 has been canceled. Claims 2, 3, and 5 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2, 3, and 5 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 2, 3, and 5 likewise are patentable over Riple.

Claim 6 recites "a fuel system interface for a gas turbine engine including a rotor, said interface coupled to the gas turbine engine to receive electrically and mechanically originated over-speed signals from the engine...said interface comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received and based on pre-defined priority selection logic to prevent the rotor from over-speeding."

Riple does not describe nor suggest a fuel system interface for a gas turbine engine including a rotor, wherein the interface is coupled to the gas turbine engine to receive electrically and mechanically originated over-speed signals from the engine, and wherein the interface includes a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received and based on pre-defined priority selection logic to prevent the rotor from over-speeding. Specifically, Riple does not describe nor suggest a fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the present invention, Riple describes a fuel control system that shuts of fuel flow via mechanical linkage when a predetermined operating speed is exceeded, rather than in response to pre-defined priority logic. For at least the reasons set forth above, Claim 6 is submitted to be patentable over Riple.

Claim 10 has been canceled. Claims 7-9, 11, and 12 depend, directly or indirectly, from independent Claim 6. When the recitations of Claims 7-9, 11, and 12 are considered in combination with the recitations of Claim 6, Applicant submits that dependent Claims 7-9, 11, and 12 likewise are patentable over Riple.

Claim 13 recites a gas turbine engine comprising "a fuel delivery system...a fuel system interface coupled to said fuel delivery system to receive a plurality of electrically and mechanically originated over-speed signals from the engine, said interface comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent said rotor from over-speeding."

Riple does not describe nor suggest a gas turbine engine including a fuel delivery system, and a fuel system interface that is coupled to said fuel delivery system to receive a plurality of electrically and mechanically originated over-speed signals from the engine, wherein the interface includes a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent said rotor from over-speeding. Specifically, Riple does not describe nor suggest a gas turbine engine fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the present invention, Riple describes a fuel control system that shuts of fuel flow via mechanical linkage when a predetermined operating speed is exceeded, rather than in response to pre-defined priority logic. For at least the reasons set forth above, Claim 13 is submitted to be patentable over Riple.

Claim 17 has been canceled. Claims 14-16 and 18 depend, directly or indirectly, from independent Claim 13. When the recitations of Claims 14-16 and 18 are considered in combination with the recitations of Claim 13, Applicant submits that dependent Claims 14-16 and 18 likewise are patentable over Riple.

For the reasons set forth above, Applicant respectfully requests that the Section 102 rejection of Claims 1-18 be withdrawn.

The rejection of Claims 1-18 under 35 U.S.C. § 102 as being anticipated by Hatch et al. is respectfully traversed.

Hatch et al. describe a fuel governor 60 which controls fuel flow to a combustor 98 to set gas generator speed in relation to a throttle lever 184 and in response to a signal input that is indicative of the speed of a transmission input shaft 36. Governor 60 includes a mechanical speed sensor 208, and reset solenoids 239 and 257 used to override and adjust

fuel flow in response to input operating parameters of the engine 30. A scheduling valve 62 controls fuel flow during engine acceleration to maintain turbine temperatures at a substantially constant level. Scheduling valve 62 receives various pressure and temperature inputs and controls fuel flow during engine deceleration to control combustion. A variable guide vane control 66 is used to position variable turbine guide vanes to control the speed of a power turbine section 54, and includes an electromechanical portion and a hydromechanical portion.

Claim 1 recites a method for assembling a gas turbine engine to prevent rotor over-speeding, wherein the method comprises the steps of "coupling a fuel system interface including a shutoff shuttle valve to the gas turbine engine such that the fuel system interface receives electrically and mechanically originated over-speed signals inputted from the engine... coupling the fuel system interface shutoff shuttle valve to the fuel system to stop engine fuel flow in response to the over-speed signals received, and based on pre-defined priority logic."

Hatch et al. do not describe nor suggest a method for assembling a gas turbine engine to prevent rotor over-speeding, wherein the method includes the steps of coupling a fuel system interface including a shutoff shuttle valve to the gas turbine engine such that the fuel system interface receives electrically and mechanically originated over-speed signals inputted from the engine, and coupling the fuel system interface shutoff shuttle valve to the fuel system to stop engine fuel flow in response to the over-speed signals received, and based on pre-defined priority logic. Specifically, Hatch et al. do not describe nor suggest a fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the present invention, Hatch et al. describe a fuel governor that shuts of fuel flow when a predetermined operating speed is exceeded, rather than in response to an electrically-originated and/or mechanically-originated signal and based on pre-defined priority logic based on . For at least the reasons set forth above, Claim 1 is submitted to be patentable over Hatch et al.

Claim 4 has been canceled. Claims 2, 3, and 5 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2, 3, and 5 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 2, 3, and 5 likewise are patentable over Hatch et al..

Claim 6 recites "a fuel system interface for a gas turbine engine including a rotor, said interface coupled to the gas turbine engine to receive electrically and mechanically originated over-speed signals from the engine...said interface comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received and based on pre-defined priority selection logic to prevent the rotor from over-speeding."

Hatch et al. do not describe nor suggest a fuel system interface for a gas turbine engine including a rotor, wherein the interface is coupled to the gas turbine engine to receive electrically and mechanically originated over-speed signals from the engine, and wherein the interface includes a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received and based on pre-defined priority selection logic to prevent the rotor from over-speeding. Specifically, Hatch et al. do not describe nor suggest a fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the present invention, Hatch et al. describe a fuel governor that shuts of fuel flow when a predetermined operating speed is exceeded, rather than in response to an electrically-originated and/or mechanically-originated signal and based on pre-defined priority logic based on . For at least the reasons set forth above, Claim 6 is submitted to be patentable over Hatch et al.

Claim 10 has been canceled. Claims 7-9, 11, and 12 depend, directly or indirectly, from independent Claim 6. When the recitations of Claims 7-9, 11, and 12 are considered in combination with the recitations of Claim 6, Applicant submits that dependent Claims 7-9, 11, and 12 likewise are patentable over Hatch et al.

Claim 13 recites a gas turbine engine comprising "a fuel delivery system...a fuel system interface coupled to said fuel delivery system to receive a plurality of electrically and mechanically originated over-speed signals from the engine, said interface comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent said rotor from over-speeding."

Hatch et al. do not describe nor suggest a gas turbine engine including a fuel delivery system, and a fuel system interface that is coupled to said fuel delivery system to receive a plurality of electrically and mechanically originated over-speed signals from the engine,

wherein the interface includes a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent said rotor from over-speeding. Specifically, Hatch et al. do not describe nor suggest a gas turbine engine fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the present invention, Hatch et al. describe a fuel governor that shuts of fuel flow when a predetermined operating speed is exceeded, rather than in response to an electrically-originated and/or mechanically-originated signal and based on pre-defined priority logic based on . For at least the reasons set forth above, Claim 13 is submitted to be patentable over Hatch et al.

Claim 17 has been canceled. Claims 14-16 and 18 depend, directly or indirectly, from independent Claim 13. When the recitations of Claims 14-16 and 18 are considered in combination with the recitations of Claim 13, Applicant submits that dependent Claims 14-16 and 18 likewise are patentable over Hatch et al.

For the reasons set forth above, Applicant respectfully requests that the Section 102 rejection of Claims 1-18 be withdrawn.

The rejection of Claims 1-18 under 35 U.S.C. § 102 as being anticipated by Smith et al. is respectfully traversed.

Smith et al. describe a gas turbine or combined cycle electric power plant 10 including a control system 50 having an overspeed protection limit control that is coupled to a turbine fuel or valve position control 11G to control the operating level of the turbine 12. More specifically, control system 50 reacts to close turbine fuel valves when the speed of turbine 12 exceeds a pre-determined overspeed value.

Claim 1 recites a method for assembling a gas turbine engine to prevent rotor over-speeding, wherein the method comprises the steps of "coupling a fuel system interface including a shutoff shuttle valve to the gas turbine engine such that the fuel system interface receives electrically and mechanically originated over-speed signals inputted from the engine... coupling the fuel system interface shutoff shuttle valve to the fuel system to stop engine fuel flow in response to the over-speed signals received, and based on pre-defined priority logic."

Smith et al. do not describe nor suggest a method for assembling a gas turbine engine to prevent rotor over-speeding, wherein the method includes the steps of coupling a fuel system interface including a shutoff shuttle valve to the gas turbine engine such that the fuel system interface receives electrically and mechanically originated over-speed signals inputted from the engine, and coupling the fuel system interface shutoff shuttle valve to the fuel system to stop engine fuel flow in response to the over-speed signals received, and based on pre-defined priority logic. Specifically, Smith et al. do not describe nor suggest a fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the present invention, Smith et al. describe a control system that positions turbine fuel valves when a predetermined overspeed value is exceeded, rather than in response to an electrically-originated and/or mechanically-originated signal and based on pre-defined priority logic based on . For at least the reasons set forth above, Claim 1 is submitted to be patentable over Smith et al.

Claim 4 has been canceled. Claims 2, 3, and 5 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2, 3, and 5 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 2, 3, and 5 likewise are patentable over Smith et al..

Claim 6 recites "a fuel system interface for a gas turbine engine including a rotor, said interface coupled to the gas turbine engine to receive electrically and mechanically originated over-speed signals from the engine...said interface comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received and based on pre-defined priority selection logic to prevent the rotor from over-speeding."

Smith et al. do not describe nor suggest a fuel system interface for a gas turbine engine including a rotor, wherein the interface is coupled to the gas turbine engine to receive electrically and mechanically originated over-speed signals from the engine, and wherein the interface includes a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received and based on pre-defined priority selection logic to prevent the rotor from over-speeding. Specifically, Smith et al. do not describe nor suggest a fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the present invention, Smith et al. describe a control system that positions turbine fuel valves

when a predetermined overspeed value is exceeded, rather than in response to an electrically-originated and/or mechanically-originated signal and based on pre-defined priority logic based on . For at least the reasons set forth above, Claim 6 is submitted to be patentable over Smith et al.

Claim 10 has been canceled. Claims 7-9, 11, and 12 depend, directly or indirectly, from independent Claim 6. When the recitations of Claims 7-9, 11, and 12 are considered in combination with the recitations of Claim 6, Applicant submits that dependent Claims 7-9, 11, and 12 likewise are patentable over Smith et al.

Claim 13 recites a gas turbine engine comprising "a fuel delivery system...a fuel system interface coupled to said fuel delivery system to receive a plurality of electrically and mechanically originated over-speed signals from the engine, said interface comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent said rotor from over-speeding."

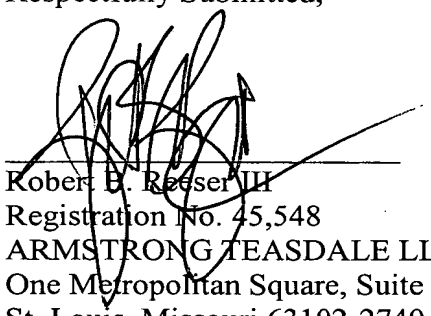
Smith et al. do not describe nor suggest a gas turbine engine including a fuel delivery system, and a fuel system interface that is coupled to said fuel delivery system to receive a plurality of electrically and mechanically originated over-speed signals from the engine, wherein the interface includes a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent said rotor from over-speeding. Specifically, Smith et al. do not describe nor suggest a gas turbine engine fuel system interface including a shutoff shuttle valve that stops engine fuel flow in response to over-speed signals received and based on pre-defined priority logic. Rather, in contrast to the present invention, Smith et al. describe a control system that positions turbine fuel valves when a predetermined overspeed value is exceeded, rather than in response to an electrically-originated and/or mechanically-originated signal and based on pre-defined priority logic based on . For at least the reasons set forth above, Claim 13 is submitted to be patentable over Smith et al.

Claim 17 has been canceled. Claims 14-16 and 18 depend, directly or indirectly, from independent Claim 13. When the recitations of Claims 14-16 and 18 are considered in combination with the recitations of Claim 13, Applicant submits that dependent Claims 14-16 and 18 likewise are patentable over Smith et al.

For the reasons set forth above, Applicant respectfully requests that the Section 102 rejection of Claims 1-18 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Linebrink

Serial No.: 09/687,886

Filed: October 13, 2000

For: METHODS AND APPARATUS FOR ROTOR OVER-SPEED PROTECTION

Art Unit: 3746

Examiner: Koczo Jr., M.

SUBMISSION OF MARKED UP PARAGRAPHS AND CLAIMS

Commissioner for Patents
Box NON-FEE AMENDMENT
Washington, D.C. 20231

Sir:

Submitted herewith are marked up paragraphs and Claims in accordance with 37 C.F.R. 1.121(b)(1)(ii) and 37 C.F.R. 1.121(c)(1)(ii).

IN THE SPECIFICATION

Please delete the paragraph beginning on page 2, line 1 and ending on page 2, line 12, and replace with the following replacement paragraph:

In an exemplary embodiment, a fuel system interface for a gas turbine engine prevents a rotor from over-speeding and receives an over-speed signal from either an electrically-originated [or] and/or a mechanically-originated over-speed sensing system. In the exemplary embodiment, the engine includes a fuel system interface including a fuel shutoff shuttle valve, a fuel shutoff valve, a fuel bypass valve, a plurality of selector valves, an aircraft control shutoff valve, and an independent speed sensing system. The fuel shutoff shuttle valve controls fuel flow to the fuel bypass valve and the fuel shutoff valve, and is coupled to the selector valves. The independent sensing system and the aircraft control shutoff valve are coupled to the selector valves. The aircraft control valve and the shutoff

shuttle valve provide parallel redundant fuel cutoff devices that each use selector valves that are employed for normal engine operation.

Please delete the paragraph beginning on page 5, line 5 and ending on page 5, line 10, and replace with the following replacement paragraph:

Aircraft control shutoff valve 70 is coupled to fuel circuits 60 and selector valves 50. More specifically, aircraft control shutoff valve 70 is coupled to fuel supply pressure circuit 62 and fuel return pressure circuit 64, such that operating aircraft control shutoff valve 70 provides "HI/LO" signal 76 to second selector valve 68. [First] Second selector valve [67] 68 selects a lowest pressure between signal 76 and fuel metering valve interlock signal 72, and transmits a signal 80 to first selector valve 67.

IN THE CLAIMS

Please cancel Claims 4, 10, and 17.

1. (once amended) A method for assembling a gas turbine engine to prevent rotor over-speeding, said method comprising the steps of:

coupling a fuel system interface including a shutoff shuttle valve to the gas turbine engine such that the fuel system interface receives electrically and mechanically originated over-speed signals inputted from the engine; and

[configuring] coupling the fuel system interface shutoff shuttle valve to the fuel system to stop engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic.

3. (once amended) A method in accordance with Claim 2 wherein said step of [configuring] coupling the fuel system interface shutoff shuttle valve further comprises the step of [configuring] coupling the fuel system interface shutoff shuttle valve to the fuel system to prevent engine fuel flow to the fuel metering head regulator and the normal fuel shutoff valve when the fuel system interface is activated as a result of an over-speed signal.

6. (once amended) A fuel system interface for a gas turbine engine including a rotor, said interface [configured] coupled to the gas turbine engine to receive electrically and mechanically originated over-speed signals from the engine, said interface [further

configured to stop] comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent the rotor from over-speeding.

13. (once amended) A gas turbine engine comprising:

a rotor;

a fuel delivery system configured to supply fuel to said engine for operating said rotor; and

a fuel system interface coupled to said fuel delivery system [and configured] to receive a plurality of electrically and mechanically originated over-speed signals from the engine, said interface [further configured to stop] comprising a shutoff shuttle valve for stopping engine fuel flow in response to the over-speed signals received, and based on pre-defined priority selection logic to prevent said rotor from over-speeding.

Respectfully Submitted,

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